an opening portion for the semiconductor layer and the source electrode to contact, wherein a width of the opening portion is wider than a gate distance of the gate region.--

A5 cont.

--19. The semiconductor device according to claim 17, further comprising an insulating film located between the semiconductor layer and the source electrode, and having an opening portion for the semiconductor layer and the source electrode to contact, wherein a width of the opening portion is wider than the gate distance of the gate region.--

REMARKS

Claims 1-10, 12 and 14-19 are pending. By this Amendment, claims 11 and 13 are canceled; claims 1, 7, 9, 10, 12 and 14 are amended; and new claims 16-19 are added. The specification is amended. The title is amended. Applicant proposes to amend FIG. 11B to change the reference number (for the oxide film) "40" to "440" to be consistent with the description at page 9, line 20, of the specification. Reconsideration and allowance are respectfully requested in view of the above amendments and the following remarks.

Allowable Subject Matter

Applicant gratefully acknowledges that the Office Action indicates that claims 7-10 contain allowable subject matter. However, for the reasons stated below, Applicant respectfully submits that each of the pending claims are believed to be allowable.

Objection to Title

The title has been changed to "SEMICONDUCTOR DEVICE HAVING REDUCED ON RESISTANCE". The new title is believed to sufficiently correlate to the claimed invention. Applicant respectfully requests that this objection be withdrawn.

Objection to Specification

The specification is amended at page 3, line 17, to describe FIG. 8 as a sectional view. This objection is believed to be overcome. Applicant therefore respectfully requests that it be withdrawn.

Rejections Under 35 U.S.C. § 112, First Paragraph

1. The Office Action rejects claims 1-11 under 35 U.S.C. § 112, first paragraph, with respect to the enablement requirement.

The Office Action asserts that the specification "never discloses how a bipolar transistor has a drain electrode, a drain region, a source electrode and a source region as claimed in claim 1". The claimed invention is shown, for example, in the embodiment depicted in Fig. 1B of the drawings. Fig. 1B shows a semiconductor device that acts as a bipolar device. The semiconductor structure includes a drain electrode 10, an n+-type source region 20 and a source electrode 22. A p+-type substrate 12 that functions as a drain region is adjacent to the drain electrode 10. The embodiment shown in FIG. 1B is described at page 4, line 8 to page 5, line 9 of the present specification.

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Accordingly, the specification and drawings are believed to sufficiently enable the claimed invention. Therefore, Applicants respectfully request that this rejection be withdrawn.

2. The Office Action rejects claims 11-15 under 35 U.S.C. § 112, first paragraph, with respect to the written description requirement.

The Office Action asserts that the specification "never discloses the source region is located substantially at a center of the channel region and the source region is isolated from the insulation film for the embodiment of claim 1 as claimed in claim 11". The features of claim 11 have been incorporated into claim 1. FIGS. 10A and 10B show an embodiment of

the semiconductor device according to the claimed invention in which an n+-type source region 220 is disposed substantially at a center of the p-type channel region 215, and is isolated from the insulation film 216. The embodiment shown in FIGS. 10A and 10B is described at page 8, line 30 to page 9, line 14 of the specification. The specification has been amended at page 9 to even more closely correspond to the language of the claimed invention. No new matter has been added.

The Office Action asserts that the specification "never discloses a depletion layer forms over the entire channel region sandwiched between the gate region when a zero bias is applied to the gate region as claimed in claim 12". Support for this feature can be found, for example, at page 5, lines 16-29, of the specification.

The Office Action asserts that the specification "never discloses the source region is located substantially at a center of the channel region and the source region is isolated from the insulation film for the embodiment of claim 12 as claimed in claim 13". As described above, this feature is supported by the specification.

The Office Action asserts that the specification "never discloses an impurity concentration in the channel region is equal to or less than an impurity concentration in the cathode region as claimed in claim 14". In order to provide antecedence for this language in claim 14, the specification is amended at page 9, line 25, to describe "an impurity concentration in the n^--type channel region 436 is equal to or less than an impurity concentration in the n^--type cathode region 434".

The Office Action asserts that the specification "never discloses the anode includes an anode electrode that forms a Schottky junction with the channel as claimed in claim 15". Support for this feature can be found at page 9, lines 21-22 of the specification.

Accordingly, the specification is believed to provide a sufficient written description of the claimed invention. Therefore, Applicant respectfully requests that this rejection be withdrawn.

Rejection Under 35 U.S.C. § 112, Second Paragraph

The Office Action rejects claims 7-10 under 35 U.S.C. § 112, second paragraph.

Claim 7 is amended to change the term "semiconductor" to "semiconductor layer" to provide strict antecedent basis for this term in claims 9 and 10. Claim 7 is also amended to change "thereof" to "of the semiconductor layer" for improved clarity.

Claim 9 is amended to change the term "space" to the "distance". Support for this amendment can be found, for example, at page 7, lines 23-24 of the present specification, which describes the "gate distance c2", shown in FIG. 8.

Claim 10 is amended to change the term "conductive layer" to "semiconductor layer" to be consistent with claim 7, from which claim 10 depends. The term "space" is also changed to "distance".

Accordingly, the claims are believed to fully comply with the requirements of 35 U.S.C. § 112, second paragraph. Therefore, Applicant respectfully requests that this rejection be withdrawn.

Rejections Under 35 U.S.C. § 102

1. The Office Action rejects claims 1 and 3 under 35 U.S.C. § 102(b) over Terashima. Applicant respectfully traverses this rejection.

Instant claim 1 recites the combined features of claim 1 and non-rejected claim 11. Accordingly, this rejection is moot. Applicant therefore respectfully requests that the rejection be withdrawn.

2. The Office Action rejects claims 14 and 15 under 35 U.S.C. § 102(b) over Mehrotra et al. ("Mehrotra"). Applicant respectfully traverses this rejection.

Claim 14 is directed to a semiconductor device, which comprises "a cathode region having a first conductive type"; "a channel region disposed on the channel region, the channel region having a second conductive type different from the first conductive type" and "an anode region disposed on the channel region" (emphasis added). Support for the amendments to claim 14 can be found, for example, at page 9, lines 15-33 of the specification. Accordingly, the claimed device includes a P-N junction between the cathode region and the channel region, which have different conductive types from each other.

In contrast, Mehrotra's rectifier does not include a cathode region having a first conductive type and a channel region having a second conductive type different from the first conductive type, as claimed.

Accordingly, Mehrotra does not anticipate claim 14. Claim 15 depends from claim 14 and thus is also not anticipated. Applicant therefore respectfully requests that this rejection be withdrawn.

Rejections Under 35 U.S.C. § 103

1. The Office Action rejects claims 2 and 4-6 under 35 U.S.C. § 103(a) over Terashima. Applicant respectfully traverses this rejection.

As stated above, instant claim 1 recites the combined features of claim 1 and non-rejected claim 11. Accordingly, this rejection is moot. Applicant therefore respectfully requests that the rejection be withdrawn.

2. The Office Action rejects claim 11 under 35 U.S.C. § 103(a) over Terashima in view of Ajit. Applicant respectfully traverses this rejection.

As stated above, the features of claim 11 have been incorporated into claim 1. Instant claim 1 recites "a channel region having the second conductive type and disposed on the drift region" and "a source region having the second conductive type provided on the channel region, the source region is located substantially at a center of the channel region, and the source region is isolated from the insulation film".

The Office Action admits that Terashima does not teach the recited source region. However, the Office Action asserts that Ajit teaches a p+ type region 18 (Fig. 15) and that it would have been obvious to have the p+ type region 18 of Ajit in Terashima. Applicant respectfully disagrees with this assertion for the following reasons.

First, Ajit provides no motivation to modify Terahshima to include the p+ type region 18, because the Terashima and Ajit structures are different from each other.

Second, the Ajit p+ type region 18 extends into the N^- drift region 6. However, claim 1 recites that the channel region and source region are of the second conductive type, i.e., the same conductive type. Accordingly, Ajit does not teach or suggest this feature of claim 1. Thus, Ajit also provides no motivation to modify the Terashima structure to include this feature of the claimed invention for this additional reason.

Thus, claim 1 would not have been rendered obvious by the applied art. Therefore, Applicant respectfully requests that this rejection be withdrawn.

3. The Office Action rejects claims 12 and 13 under 35 U.S.C. § 103(a) over Williams et al. Applicant respectfully traverses this rejection.

Instant claim 12 includes the features of claim 13, which has been canceled. Claim 12 recites "a source region having the first conductive type and provided on the channel region, the source region is located substantially at a center of the channel region, and wherein the source is isolated from the insulation film" (emphasis added). As admitted in the Office

Action, Williams fails to teach or suggest the recited source region. Accordingly, Williams provides no teaching or suggestion to somehow modify the Williams structure to achieve the claimed invention.

Accordingly, claim 12 would not have been rendered obvious by Williams. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

New Claims

New independent claim 16 recites the combined features of claims 1 and 7. In view of the indication of allowable subject matter in claim 7, claim 16 is believed to be allowable. Claims 17-19 depend from claim 16 and recite the features of claims 8-10, respectively. Accordingly, claims 17-19 are also allowable.

For the foregoing reasons, Applicant respectfully requests reconsideration and withdrawal of the objections and rejections and allowance of the pending claims.

Should the Examiner believe that anything further is desirable to place the application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the number listed below.

Respectfully submitted,

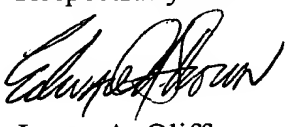

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FIG. 10A

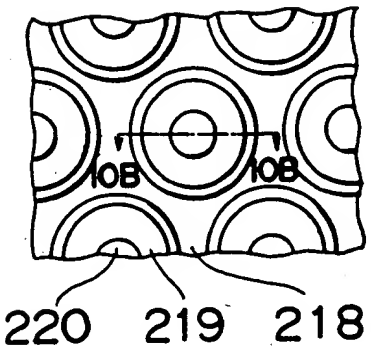


FIG. 10B

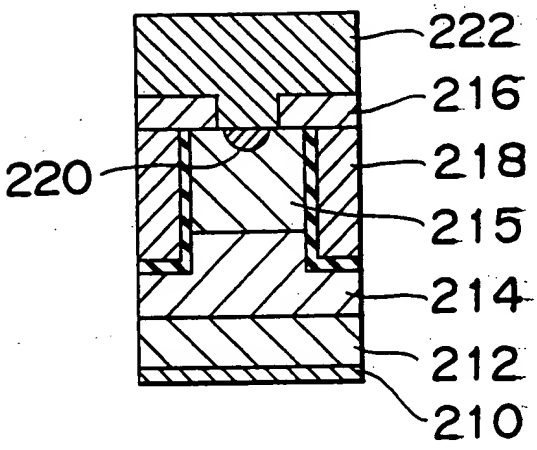


FIG. 11A

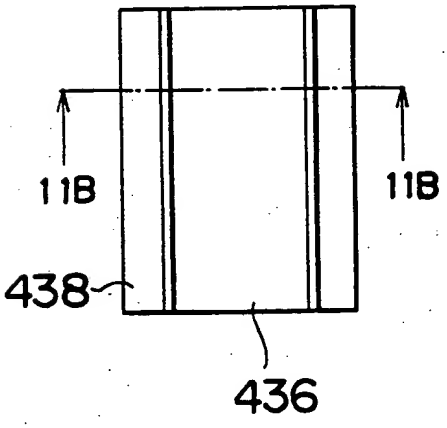
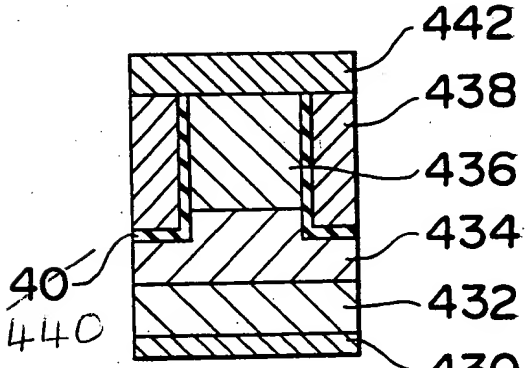


FIG. 11B



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